

---

# Opportunistic Observations of Marine Mammals from the Coastal Waters of Fog Bay, Northern Territory

SCOTT D. WHITING

*Faculty of Science, Northern Territory University, Darwin, NT 0909*

---

## Abstract

Four species of marine mammals were observed from a small boat during sea-turtle research activities in Fog Bay, west of Darwin. The Indo-Pacific hump-backed dolphin was the most frequently sighted, followed by the dugong, Irrawaddy dolphin and bottlenose dolphin. Details of each sighting, including exact location, season, group size and number of calves are provided.

## Introduction

The tropical coastal waters of Australia support four species of marine mammals, comprising the dugong *Dugong dugon* and three species of dolphins (Indo-Pacific hump-backed dolphin *Sousa chinensis*, Irrawaddy dolphin *Orcaella brevirostris*; bottlenose dolphin *Tursiops truncatus*) (Marsh *et al.* 1995). Dugongs are found in tropical and sub-tropical coastal and island waters from eastern Africa to Vanuatu but are listed as vulnerable to extinction (IUCN 1990) as their populations have declined markedly in many parts of their range (Marsh *et al.* 1995). Indo-Pacific hump-backed dolphins are widely distributed throughout coastal habitats of the Indian and western Pacific oceans (Ross *et al.* 1994), Irrawaddy dolphins are found in coastal and riverine areas from India to eastern Australia (Marsh *et al.* 1989), while the bottlenose dolphin has a cosmopolitan distribution throughout tropical and warm temperate waters (IUCN 1995). The abundances of these dolphin species are thought to have declined in many parts of their respective ranges, although evidence is weak and the extent of human induced mortality remains unknown. Threats include direct hunting, incidental capture by fishing activities, shark netting and degradation of the environment. They are all classified as "insufficiently known" (IUCN 1990).

In the Northern Territory, aerial surveys (Bayliss 1986; Bayliss & Freeland 1989; Freeland & Bayliss 1989) and incidental information (Harwood & Hembree 1987) have provided some data on the distribution and abundance of dugongs and dolphins, although these remain limited or non-existent for most areas of the coastline. For this reason baseline data are required to

---

identify areas which are important to dolphins and dugongs so that more systematic monitoring can be conducted in the future. This note reports opportunistic sightings of marine mammals in shallow coastal waters 50 km west of Darwin.

### Methods

Opportunistic sightings of marine mammals from the coastal waters between Native Point (12° 43' S, 130° 20' E) and Quail Island (12° 30' S, 130° 26' E), Fog Bay (Fig. 1) were made during sea turtle research activities between October 1995 and October 1997.

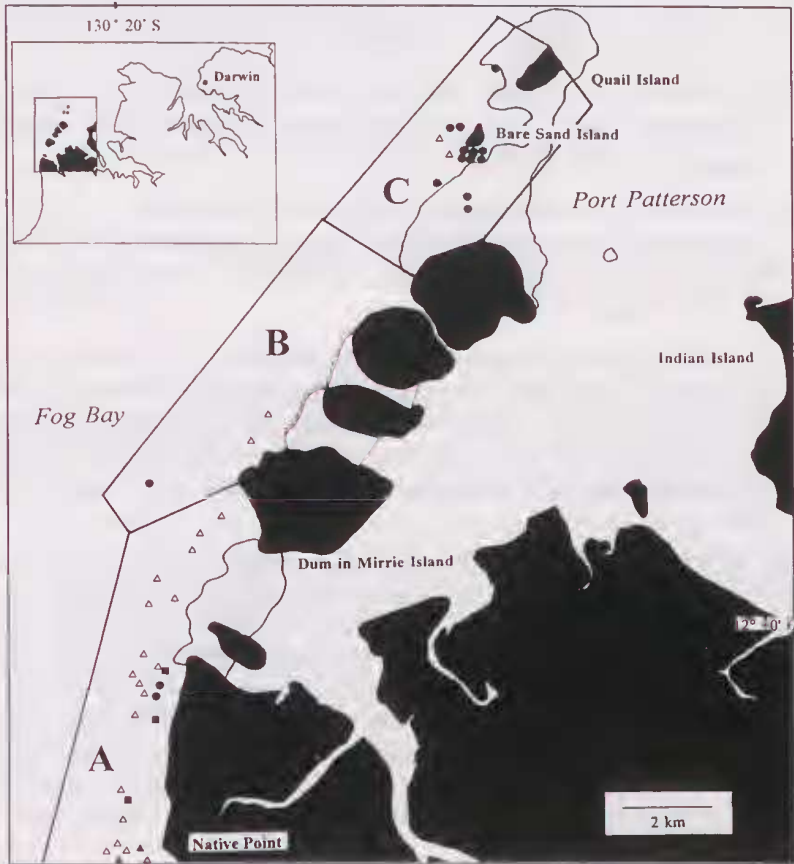


FIGURE 1 Map of marine mammal sightings in Sectors A, B & C in Fog Bay. Solid circles, dugongs; unfilled triangles, Indo-Pacific humpback dolphins; solid triangles, bottlenose dolphins; solid squares, Irrawaddy dolphins.

The area is characterised by shallow, turbid, coastal waters which experience a large tidal range (8 m) (Department of Defence 1997). The western mainland coast is rocky with some sections of sand, while the mainland coast to the east (Port Patterson) and the islands extending to the north are dominated by mangroves.

Observations were made by one person from a 3 m dinghy operating at variable speeds within 3 km of the shoreline in Sectors A, B & C and from a shore based station in Sector C (Fig. 1). Sectors were used to analyse the sightings because observation time varied between sector and season; wet (Nov.-Apr.) and dry (May-Oct.) (Bureau of Meteorology 1989). Details of how and when observations in each sector were made are listed below.

*Sector A -Native Point (Dundee Beach) to Dum in Mirrie Island*

Observations were made from a boat (during transit within the sector). This sector had the greatest number of observation hours.

*Sector B – Dum in Mirrie island to North End of Grose Island*

Observations were made from a boat (during transit within the sector). This area had the fewest observation hours. Most observations hours occurred during the dry season.

*Sector C – Around Bare Sand Island and Quail Island*

Observations were made from a boat (during transit within the sector) and from a shore based station on Bare Sand Island. Observations were conducted mainly between April and August, with intensive observation periods in June 1996 and June/July 1997 and few during the wet season.

Data recorded included species (identification using Leatherwood *et al.* 1983), number of individuals in a group, number of calves, location, and time (Corkeron 1997). Locations were determined using a Global Positioning System (GPS) or bearings to prominent coastal landmarks. Transect width was not used to create population estimates or densities because of the limited and opportunistic nature of the data and the small area surveyed. Sighting rate (number of groups sighted / observation hours) was calculated for each sector and season to determine sighting frequency. Sighting rate was used to compare between sectors and season.

Species occurrence relating to tidal state was investigated using circular statistics (mean angle, mode, chi-squared goodness of fit test with Rayleigh's test) (Zarr 1984). The tide state was scored as the number of hours after the previous high tide (e.g. 3, mid falling; 6, low; 9, mid rising;

---

12, high). Spring and neap tides were not differentiated because of limited data.

## Results

All four species of marine mammals were observed in Fog Bay during the 24 month period (Table 1; Appendix 1). Indo-Pacific hump-backed dolphins were the most common species sighted (54%), followed by dugongs (34%), Irrawaddy dolphins (7%) and bottlenose dolphins (5%).

**TABLE 1** Summary of sightings of marine mammals at Fog Bay, 1995–1997.

Species	Total no. sightings (%)	Total no. individuals* (%)	Percentage calves	Group size* (mean, sd, range)
<i>D. dugon</i>	15 (36)	18 (12)	27	1.2, 0.56, 1-3
<i>S. chinensis</i>	22 (52)	80 (55)	8	3.7, 2.87, 1-10
<i>O. brevirostris</i>	3 (7)	39 (27)	0	13.0, 8.19, 4-20
<i>T. truncatus</i>	2 (5)	8 (6)	25	4.0, 2.83, 2-6
Total	42 (100)	145 (100)	25	4.0, 2.83, 2-6

\* including calves.

Dugongs were commonly seen alone, and the mean ( $\pm$  *sd*) size of 15 groups was 1.2 ( $\pm$  0.56). Sightings were uniformly distributed around the tidal cycle ( $\chi^2 = 8.26$ ,  $v = 11$ ,  $n = 15$ ,  $0.75 < P < 0.90$ ) with no mean tide state detectable (Rayleigh's  $z = 0.648$ ,  $n = 15$ ,  $P > 0.50$ ). Dugong calves were observed between April and July and on three occasions subadult sized dugongs were observed alone. Dugongs were sighted more frequently in the dry season (Table 2), although seasonal observations were dominated by many sightings during June/July 1997 in Sector C. On two occasions (in May 1996 and June 1997) a dugong of juvenile size was observed lying motionless on the intertidal reef flat in shallow water (depth 1 m) in Sector C. Both sightings were in the same vicinity and were about 400 m from deeper water. Seagrass in this area occurs mostly subtidally and was not observed within 1 km of this location. The second of these dugongs was captured to examine obvious damage to the caudal peduncle which included deep lacerations that could have been inflicted by a fishing net or line. The damage was not fresh although it continued to bleed and secrete clear fluid. The dugong was weak but swam off after being released two minutes after capture. Three remoras *Echeneis naucrates* were attached to its underside.

Indo-Pacific hump-backed dolphins were observed more frequently during the wet season (Table 2), and if Sector B is disregarded because of low observation effort, more frequently in Sector A than Sector C. The 22 sightings were not uniformly distributed around the tidal cycle ( $\chi^2 = 30.1$ ,  $v = 11$ ,  $0.001 < P < 0.005$ ), but more frequent during the low rising tide between tide state 6 and 10 (mode = 7, mean tide state = 9, Rayleigh's  $z = 4.82$ ,  $0.005 < P < 0.01$ ). The maximum size of these groups was ten, with a mean ( $\pm$  *sd*) group size of 3.7 ( $\pm$  2.87). Calves were seen in both seasons. A large proportion of the individuals had white markings on their dorsal fin or body.

Irrawaddy dolphins were observed on three occasions only, all during the dry season of 1996. Group size ranged from four to 20, with a mean of 13.0. Bottlenose dolphins were observed on two occasions in Sector A: one in the wet season and one in the dry season (Table 2, Fig 1). Calves of these two species were not observed.

**TABLE 2** Number of groups sighted, and group sighting rate (in brackets,  $h^{-1}$ ) for each sector and season.

Sector/season	Species					
	Obs.*	<i>D. dugon</i>	<i>S. chinensis</i>	<i>O. brevirostris</i>	<i>T. truncatus</i>	All
Wet season						
A	62.4	1 (0.02)	14 (0.22)	3 (0.05)	2 (0.03)	18 (0.29)
B	1.8	1 (0.55)				1 (0.55)
C	9.0		1 (0.11)			1 (0.11)
Dry season						
A	51.3	1 (0.02)	5 (0.10)			6 (0.12)
B	9.2		2 (0.29)			2 (0.22)
C	81.8	12 (0.15)	1 (0.01)			12 (0.15)
Pooled data						
Wet	73.3	2 (0.03)	15 (0.21)	3 (0.04)	2 (0.03)	22 (0.30)
Dry	142.3	13 (0.09)	7 (0.05)			22 (0.10)
A	113.8	2 (0.02)	12 (0.17)			14 (0.12)
B	11.0	1 (0.09)	2 (0.18)			1 (0.09)
C	90.8	12 (0.14)	2 (0.01)			12 (0.13)
Total	216	15 (0.07)	23 (0.11)	3 (0.01)	2 (0.09)	43 (0.20)

\*Observation time in hours.

## Discussion

The most frequently observed species recorded from the study area was the Indo-Pacific hump-backed dolphin. This contrasts with other studies which show that dugongs are the most abundant species of marine mammal in inshore waters of northern Australia (Marsh *et al.* 1995). This difference may be because the observations in the Fog Bay study were from a boat, opportunistic, conducted over a small study area, small in sample size and lacked indexes for sightability (Marsh & Sinclair 1989a,b). Even though regular boat surveys of small areas (such as those conducted in Fog Bay) may not be comparable to aerial surveys, they can provide detailed information on small scale habitat use and seasonality and help to identify critical habitat. They also allow closer identification of dolphin species which can be difficult from the air.

Dugongs may have been sighted more frequently during the dry season because the study area is exposed to strong westerly winds and seas during the wet season which may cause dugongs to move to more sheltered waters (e.g. Port Patterson) during this period. The frequency and regularity with which dugongs were sighted in the channel adjacent to Bare Sand Island (Sector C) indicates that this area is important and regularly used, possibly because it offers an area of localised shelter or supports subtidal seagrass. Similarly, the area around an intertidal rock pool on the mainland coast in Sector A appears to be important to dugongs. Group sizes of dugongs in Fog Bay were similar to those reported in other studies (Bayliss 1986), although large groups consisting of up to 40 individuals have been observed several times in recent years approximately 15 km west of Dum in Mirrie Island (M., M. & D. Baumber, pers. comm.). The observations of the two dugongs on the reef flat in Sector C were interesting because seagrass does not occur in this habitat. Dugongs may use these shallow areas to avoid large sharks when they are sick or injured. This was the case for the second dugong observed in this location which was weak and had a severe laceration to the caudal peduncle, probably caused by a monofilament line or net.

The distribution and abundance of Indo-Pacific dolphins is not well known in northern Australia (FAO 1993; Ross *et al.* 1994). Group sizes (< 10) in Fog Bay conform to those reported elsewhere (FAO 1993). White markings observed on individuals were similar to those reported in Queensland (Ross *et al.* 1994). Although seasonal movements have not been identified for any population (Ross *et al.* 1994), groups in Fog Bay were observed more frequently in the wet season. Observations of Indo-Pacific hump-backed dolphins in Fog Bay feeding on the low rising tide are supported by similar observations of behaviour reported by Ross *et al.* (1994).

---



**PLATE 4** An adult dugong surfacing for air at Ashmore Reef. (S.D. Whiting)

Two of the three groups of Irrawaddy dolphins sighted were large, the mean group size being 13.0. This contrasts with the mean group size of 1.63 reported by an aerial survey of this region (Freeland & Bayliss 1989). FAO (1993) state that group sizes fewer than six are usual, but groups of up to 15 individuals have been reported. These sightings are important as little is known about this species in Australia. Bottlenose dolphins were relatively uncommon in the inshore waters of Fog Bay, in contrast to the situation in the cooler coastal waters of central Western Australia (Preen *et al.* 1997).

These opportunistic sightings add to existing records of marine mammals along the NT coast (Marsh 1988; FAO 1993). Opportunistic boat based surveys, although not as rigorous as specifically designed boat-based (Gill 1997), land-based (Aragones 1994; Rugh *et al.* 1990) or aerial (Marsh & Sinclair 1989a, b) surveys, offer the benefit of detailed information without the high costs which are involved in operating surveys independently of other projects. If used in conjunction with other studies, this type of survey can be cost-effective means of gathering baseline data on presence and relative abundance as well as details on habitat use, behaviour and seasonality.

---

## Acknowledgements

This study was made possible by financial assistance from National Estates Grants Program, Queens Trust for Young Australians and Keep Australia Beautiful Committee which supported sea turtle research in the area. I thank Diane Fontannaz (who volunteered for most field trips in 1996) and other volunteers who assisted during this research. Special thanks go to Felicity Butler and Annette Cook who helped to catch the injured dugong. Thanks also go to the Baumber family (Dum in Mirrie Island) who are always willing to share their wealth of knowledge of the Fog Bay area. I thank Richard Noske, Peter Corkeron and Alan Andersen for their comments on the manuscript.

## References

- Aragones, L.V. (1994) Observation on dugongs at Calcauit Island, Busuanga, Palawan, Philippines. *Wildlife Research* **21**, 709–717.
- Bayliss, P. (1986) Factors affecting aerial surveys of marine fauna, and their relationship to a survey of dugongs in the coastal waters of the northern Territory. *Australian Wildlife Research* **13**, 27–37.
- Bayliss, P. & Freeland, W.J. (1989) Seasonal distribution and abundance of dugongs in the Gulf of Carpentaria. *Australian Wildlife Research* **16**, 141–149.
- Bureau of Meteorology (1989) *Climate Averages, Australia*. Australian Government Publishing Service, Canberra.
- Corkeron, P.J. (1997) Bottlenose dolphins in southeast Queensland waters: social structure and conservation biology. In: *Marine Mammal Research in the Southern Hemisphere. Volume 1. Status, Ecology and Medicine* (eds M. Hindell & C. Kemper) pp 1–11. Surrey Beatty & Sons, Chipping Norton.
- Department of Defence (1997) *Australian National Tide Tables*. Commonwealth of Australia. Adelaide.
- FAO (1993) *Marine Mammals of the World: FAO Species Identification Guide*. (eds T.A. Jefferson, S. Leatherwood, & M.A. Webber). UNEP & FAO, Rome.
- Freeland, W.J. & Bayliss, P. (1989) The Irrawaddy river dolphin (*Orcaella brevirostris*) in coastal waters of the Northern Territory, Australia: distribution, abundance and seasonal changes. *Mammalia* **53**, 49–57.
- Gill, P.C. 1997. A yacht-based cetacean cruise to Antarctic waters south of Australia. In: *Marine Mammal Research in the Southern Hemisphere. Volume 1. Status, Ecology and Medicine* (eds M. Hindell & C. Kemper) pp 30–39. Surrey Beatty & Sons, Chipping Norton.
- Harwood, M.B. & Hembree, D. (1987) Incidental catch of small cetaceans in the offshore gillnet fishery in northern Australian waters: 1981–1985. *Report International Whaling Commission* **34**, 555–559.
- IUCN (1990) *1990 IUCN Red List of Threatened Species*. IUCN Publications, Cambridge.
-



- IUCN (1995) *Dolphins, Porpoises and Whales; 1994–1998* (compiled by R.R. Reeves & S. Leatherwood). IUCN, Gland.
- Leatherwood, S., Reeves, R.R. & Foster, L. (1983) *The Sierra Club Handbook of Whales and Dolphins*. Sierra Club, San Francisco.
- Marsh, H. (1988) An ecological basis for Dugong conservation in Australia. In: *Marine Mammals of Australia; Field Biology and Captive Management* (ed M.L. Augee) pp 9–85. The Royal Zoological Society of New South Wales, Mosman.
- Marsh, H., Corkeron, P.J., Limpus, C.J., Shaughnessy, P.D. & Ward, T.M. (1995) The reptiles and mammals in Australian seas; their status and management. In: *State of the Marine Environment Report for Australia. Technical Annex 1* (eds L. P. Zann & P. Kailola) pp 151–166. Great Barrier Reef Marine Park Authority, Townsville.
- Marsh, H., Lloze, R., Heinsohn, G.E. & Kauya, T. (1989) Irrawaddy River Dolphin – *Orcaella brevirostris* (Gray, 1866). In: *Handbook of Marine Mammals. Volume 4* (eds S.H. Ridgeway & R. J. Harrison) pp 101–118. Academic Press, London.
- Marsh, H. & Sinclair, D.F. (1989a) Correcting for visibility bias in strip transect aerial surveys of aquatic fauna. *Journal of Wildlife Management* **53**, 1017–1024.
- Marsh, H. & Sinclair, D.F. (1989b) An experimental evaluation of dugong and sea turtle aerial survey techniques. *Australian Wildlife Research* **16**, 639–650.
- Preen, A.R., Marsh, H., Lawler, I.R., Prince, R.I.T. & Shepherd, R. (1997) Distribution and abundance of dugongs, turtles, dolphins and other megafauna in Shark Bay, Ningaloo Reef and Exmouth Gulf, Western Australia. *Wildlife Research* **24**, 185–208.
- Ross, G.J.B., Heinsohn, G.E. & Cockcroft, V.G. (1994) Humpback Dolphins *Sousa chinensis* (Osbeck, 1765), *Sousa plumbea* (G. Cuvier, 1829) and *Sousa teuszii* (Kukenthal, 1892). In: *Handbook of Marine Mammals. Volume 5* (eds S.H. Ridgeway & R.J. Harrison) pp 23–42. Academic Press, London.
- Rugh, D., Ferrero, R. & Dahlheim, M. (1990) Inter-observer discrepancies in a shore-based census of gray whale (*Eschrichtius robustus*). *Marine Mammal Science* **6**, 109–120.
- Zarr, J.H. (1984) *Biostatistical Analysis*. Prentice-Hall Inc., Englewood Cliffs.
-

**Appendix 1** List of observations of marine mammals from Fog Bay, Northern Territory.

Date	Time	SP	Group size	Calves	Sect.	Lat.	Long.	Tide Ht (m)
07/10/95	1115	S	3		A	12 39.00	130 20.30	6
29/10/95	1120	S	10	2	A	12 40.00	130 20.30	12
08/11/95	1120	S	8	1	A	12 43.20	130 20.30	7
08/11/95	1145	S	3	1	A	12 42.50	130 20.30	7
20/11/95	1115	S	2		A	12 40.50	130 20.30	7
24/11/95	1030	S	5	1	C	12 32.30	130 24.40	4
07/12/95	1315	S	5		A	12 43.20	130 21.00	8
07/12/95	1730	S	2		A	12 41.00	130 20.30	11
02/02/96	1530	S	1	1	A	12 39.50	130 22.70	10
03/02/96	1500	S	1		A	12 40.20	130 20.50	9
04/02/96	1500	S	2		A	12 42.00	130 20.30	8
15/03/96	1230	T	6	2	A	12 43.20	130 20.30	10
14/03/96	1015	S	2		A	12 41.80	130 20.55	10
15/04/96	1430	D	1		A	12 40.40	130 20.85	9
26/05/96	0950	D	1	1	C	12 25.10	130 33.10	2
28/05/96	0930	O	15		A	12 42.80	130 20.40	7
02/06/96	1530	D	3	1	C	12 33.24	130 24.58	6
06/07/96	0800	S	10		B	12 37.50	130 21.80	2
29/06/96	0900	O	20		A	12 41.50	130 20.70	5
08/08/96	1300	O	4		A	12 40.45	130 20.80	2
11/08/96	1215	D	1		A	12 40.95	130 20.70	8
24/09/96	1000	S	6		A	12 43.30	130 20.65	6
09/11/96	1200	S	1		A	12 47.00	130 20.50	7
09/11/96	1330	S	1		A	12 39.50	130 21.00	9
27/11/96	1700	S	1		A	12 37.50	130 21.30	10
28/11/96	0830	S	3		A	12 38.30	130 21.20	7
08/04/97	1300	D	1	1	B	12 37.75	130 20.12	7
28/04/97	1500	S	7		A	12 39.30	130 21.00	6
06/04/97	1100	T	2		A	12 43.00	130 20.00	6
25/06/97	1700	D	1		C	12 32.00	130 24.60	8
26/06/97	1200	D	1		C	12 32.50	130 25.00	3

continued

**Appendix 1** (continued) List of observations of marine mammals from Fog Bay, Northern Territory.

Date	Time	SP	Group size	Calves	Sect.	Lat.	Long.	Tide Ht (m)
27/06/97	1430	D	2		C	12 32.00	130 24.60	9
28/06/97	1630	D	1		C	12 31.40	130 25.20	10
29/06/97	1100	D	1		C	12 33.46	130 24.66	11
29/06/97	1300	D	1		C	12 32.50	130 25.00	1
07/07/97	1700	S	2		B	12 37.50	130 21.80	10
07/08/97	1100	S	3		A	12 41.20	130 20.30	3
15/07/97	1330	D	1	1	C	12 32.50	130 25.00	1
15/07/97	1630	S	2		C	12 32.50	130 24.70	4
16/07/97	1400	D	1	1	C	12 32.50	130 25.00	12
09/07/97	1200	D	1		C	12 32.50	130 25.00	9
11/07/97	1300	D	1		C	12 32.50	130 25.00	4

DATE = dd/mm/yy, SEAS.= SEASON (wet season, dry season), Time = 24 hour, SP = Species (D=Dugong, S=Indo-Pacific hump-backed dolphin, O = Irrawaddy dolphin, T=Bottlenose dolphin), GROUP SIZE = No. of individuals in group, CALVES = No. of calves in group, SECT = Section of Study Area (A, B, C), LAT. = Latitude, LONG. = Longitude, TIDE HT = Tide Height (number of hours after high tide, e.g. 3 = mid falling, 6 = low, 9 = mid rising, 12 = high), TIDE STATE = spring (S) or Neap (N) tides.